

Application No. 10/529,304
Reply to Official Action mailed on April 6, 2007

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Remarks/Arguments

Claims 1-28 and 30-38 are currently pending in the instant application. Claims 1-28 and 30-38 currently stand rejected. Claim 3 has been cancelled. Claims 1, 20, 21, 32, 33, 36 and 37 have been amended.

Finality of the Office Action

The Office Action mailed on April 6, 2007 has been made final. Applicant respectfully submits that the instant amendment, if entered, would place all finally rejected claims in proper condition for allowance. The amendments are based on wording that is taken from dependent claim 3, and as such raises no new issues and requires no additional searching. In addition, the Examiner has indicated during the telephone interview conducted on May 11, 2007 that the proposed claim amendments would be sufficient to overcome the current rejections and would likely provide patentability over the prior art. The Examiner also stated that if during the course of his search he uncovers any additional prior art, he would call the undersigned to discuss. Accordingly, Applicant respectfully requests that the instant amendment be entered.

Telephone Interview Summary

Applicant wishes to thank the Examiner for agreeing to conduct the telephone interview of May 11, 2007. A complete and proper recordation of the substance of the telephone interview is provided, as follows:

- A) No exhibits were shown nor was any demonstration conducted.
- B) Claims 1 and 20 were discussed.
- C) The sole reference discussed was Spangler (U.S. 6,124,592).
- D) During the telephone interview, the Examiner suggested that claim 1 might be amended to include the feature that is recited at claim 3 currently of record. The

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Examiner further suggested that claim 20 might be amended to include a similar feature, worded appropriately. The Examiner indicated that such amendments would define over Spangler.

- E) During the course of the telephone interview, Applicant argued that Spangler does not teach or suggest every feature of the invention in as complete detail as is recited in independent claims 1 and 20.

Having regard to claim 1, Applicant argued that none of the portions of the Spangler reference that were identified in the Final Office Action mailed on April 6, 2007 actually teaches (either explicitly or impliedly) a step of extracting the selectively separated ions from the analyzer region substantially during operation in the rf-only mode. For instance, at point 4 (see page 2 of the Final Office Action mailed on April 6, 2007), the Examiner states "Spangler teaches at Col. 6, lines 33-44 that ...the ions are then scanned out of the trap by varying...the AC or DC potentials and/or their ratios, **between predetermined limits.**" Applicant pointed out that clearly Spangler felt that it was necessary to specify that there are limits between which the AC or DC potentials and/or their ratios may be varied in order to scan ions out of the trap successfully. The words "between predetermined limits" certainly were included deliberately, and as such it would be improper to disregard Spangler's explicit teaching of such predetermined limits. Furthermore, it would appear that this statement is intended to apply to all embodiments of the invention, as it is included in the section that summarizes the invention and without reference to any specific embodiment. Unfortunately, Spangler does not go on to define precisely just what those limits might be, but clearly this cautionary note would at least suggest to one of skill in the art that they should not extend too far beyond the limits that are set out in the various specific examples that are discussed in the Spangler reference, none of which teaches FAIMS separation followed by ion extraction in rf-only mode.

Applicant noted that the remaining sections being relied upon to maintain the rejection of claim 1 under 35 U.S.C. 102(b) also fail to teach (either explicitly or

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impliedly) the invention in as complete detail as is claimed in claim 1. The Examiner maintained the position that when interpreted broadly, claim 1 is anticipated by Spangler's earlier disclosure. In addition, the Examiner proposed an amendment to claim 1 as is discussed in more detail in point G, below.

The Applicant also noted that Figure 38 of the Spangler reference does not show an ion mobility storage trap (IMST) in which the electrodes have the form of a quadrupole rod assembly. Rather, Figure 38 shows an IMST including ring and end cap electrodes 1 and 2, respectively, adjacent to a drift tube ion mobility spectrometer 62. The only mention of a quadrupole rod assembly in the entire Spangler reference appears in the background section at Column 4 and at Figure 5. Even then, Spangler's discussion is limited to a quadrupole mass filter device, and there is no suggestion that the quadrupole rod assembly is adaptable for use as an IMST.

- F) No other pertinent matters were discussed.
- G) Applicant agreed to take the Examiner's suggested claim amendments under consideration. In response, the Examiner indicated that Spangler does not appear to teach or suggest controllably switching between FAIMS operating mode and rf-only operating mode. The Examiner stated that the suggested amendments to the claims would advance the prosecution of the instant application, and would overcome the current claim rejections based on the prior art.

Claim Rejections – 35 USC § 102

Claims 1-6, 8, 11, 12, 14, 17-22, 25-34, 36 and 37 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Spangler (US 6,124,592).

Applicant has amended claim 1 to recite the feature that appears at claim 3 currently of record. In particular, amended claim 1 recites "controllably switching the analyzer region from the FAIMS mode to the rf-only mode." As discussed *supra*, the

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Examiner indicated during the telephone interview conducted on May 11, 2007 that Spangler does not appear to teach "controllably switching the analyzer region from the FAIMS mode to the rf-only mode" in combination with the other features of amended claim 1. Examples of support for the proposed amendments may be found in the application at claim 3 and at paragraphs [0074] through [0076]. At paragraph [0074] Applicant states:

"...the time that is required for transition between the rf-only mode and the FAIMS mode is in practice other than zero. It is therefore important that the electronic transitions be controlled in a manner to avoid loss of ions to the walls of the electrodes. For example, removal of the waves and waveforms with remaining dc voltages in place results in loss of the ions. Accordingly, the waveform transitions should be synchronized with changes in dc voltages. Note also that at lower gas pressures, the ion mobility is very high and the ions may respond to the fields quite rapidly. Therefore the transitions between modes of operation must be controlled carefully."

Paragraphs [0075] and [0076] provide details for two approaches for control of the transition between rf-only and FAIMS modes of operation. Accordingly, no new matter has been added. Applicant respectfully submits that amended claim 1 is now in proper condition for allowance. Favorable consideration is kindly requested.

Claim 2 depends from believed allowable claim 1 and is also believed to be in proper condition for allowance. Favorable consideration is respectfully requested.

Claim 3 has been cancelled.

Claim 4 currently of record recites "wherein the analyzer region is provided as a space between a set of parallel rods, the space having first and second ends." Although Spangler does discuss such electrode geometry (see Fig. 5 as well as col. 4, lines 25-61), Spangler does also go on to state at col. 6, lines 23-30 "to date, none of the mass spectrometer devices of FIGS. 5-9 have been successfully used to separate ions at pressure greater than about 10^{-2} mmHg. Any attempt to do so results in loss of signal." At no point

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does Spangler teach or even suggest the use of the quadrupole rod arrangement (of Fig. 5) as a suitable geometry for use as an IMST. Applicant respectfully submits that Spangler does not teach all of the features as claimed at claim 4, and accordingly claim 4 currently of record is believed to be in proper condition for allowance. Favorable consideration is respectfully requested.

Claims 5, 6, 8, 11, 12, and 17-19 depend either directly or indirectly from believed allowable amended claim 1 and are also believed to be in proper condition for allowance. Favorable consideration is respectfully requested.

Claim 14 is believed to be in proper condition for allowance for the same reasons that were presented *supra* with reference to claim 4, *mutatis mutandis*. Favorable consideration is respectfully requested.

Claim 20 has been amended as follows (where underlining indicates added text and strike-through or double square-brackets indicates deleted text):

“An apparatus for separating ions comprising:

a set of parallel rods having a space therebetween, the space having first and second ends and defining an analyzer region; and,

an electrical controller for electrically coupling to the set of parallel rods, for applying a radio frequency (rf)-voltage at least an rf-voltage between the parallel rods of the set of parallel rods in a rf-only first operating mode, [[and]] for applying a combination of an asymmetric waveform voltage and a direct current voltage between the parallel rods of the set of parallel rods in a FAIMS second operating mode, and for controllably switching between the rf-only operating mode and the FAIMS operating mode.

wherein, during use, an ion which is being transmitted through the analyzer region is subjected to the first rf-only operating mode and to the FAIMS second operating mode during a period of time the ion is resident within the analyzer region.”

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In order to provide more consistent usage of terminology throughout the claims, Applicant has amended the terms "first operating mode" and "second operating mode" to read "rf-only operating mode" and "FAIMS operating mode," respectively. Applicant submits that this is not a narrowing amendment, since the claim includes a description of the voltages that are applied between the parallel rods in each of the first and second operating modes, and at the time the invention was made, a person having ordinary skill in the art would have understood the "first operating mode" to be "rf-only mode" and the "second operating mode" to be "FAIMS mode".

Claim 20 has been further amended to specify that the electrical controller is for "controllably switching between the rf-only operating mode and the FAIMS operating mode." As is discussed *supra* with reference to amended claim 1, Spangler does not teach or suggest "controllably switching the analyzer region from the FAIMS mode to the rf-only mode." Accordingly, amended claim 20 is believed to be in proper condition for allowance. Favorable consideration is requested.

Claim 21 has been amended in order to provide terminology that is consistent with that of amended claim 20. In particular, the terms "first operating mode" and "second operating mode" have been amended to read "rf-only operating mode" and "FAIMS operating mode," respectively. The amendments to claim 21 are not believed to be narrowing for the same reasons that were presented with reference to amended claim 20. Amended claim 21 depends from believed allowable amended claim 20 and is also believed to be in proper condition for allowance. Favorable consideration is requested.

Claims 22 and 25-28 depend either directly or indirectly from believed allowable amended claim 20 and are also believed to be in proper condition for allowance. Favorable consideration is respectfully requested.

Claims 30 and 31 depend indirectly from believed allowable amended claim 1 and are also believed to be in proper condition for allowance. Favorable consideration is respectfully requested.

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Claim 32 has been amended as follows (where underlining indicates additional text, strike-through or double square-brackets indicates deleted text):

~~"comprising a wherein the~~ step of controllably switching the analyzer region from the FAIMS mode to the rf-only mode ~~[[by]]~~ comprises controllably changing a waveform applied to pairs of opposite rods of the parallel rods, by changing a relative phase shift of two component sinusoidal waves of the waveform

This amendment has been necessitated by the amendment to claim 1, discussed *supra*. No new matter has been added. Amended claim 32 depends from believed allowable amended claim 1 and is also believed to be allowable. Favorable consideration is requested.

Claim 33 has been amended. The term "a step of" has been amended to read "the step of." No new matter has been added. Amended claim 33 depends indirectly from believed allowable amended claim 1 and is also believed to be in proper condition for allowance. Favorable consideration is requested.

Claim 36 has been amended for improved clarity. No new matter has been added. Amended claim 36 depends indirectly from believed allowable claim 20 and is also believed to be in proper condition for allowance. Favorable consideration is respectfully requested.

Claim 37 has been amended to depend from claim 1. The cancellation of claim 3 has necessitated this amendment. No new matter has been added. Amended claim 37 depends from believed allowable amended claim 1 and is also believed to be in proper condition for allowance. Favorable consideration is requested.

Claim Rejections – 35 USC § 103

Claims 7, 9, 10, 13, 15, 16, 23, 24 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,124,592 to Spangler in view of Whitehouse, U.S. Patent No. 7,034,292.

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Claims 7, 9, 10, 13, 15, 16 and 35 depend either directly or indirectly from believed allowable amended claim 1. Accordingly, claims 7, 9, 10, 13, 15, 16 and 35 are also believed to be in proper condition for allowance. Favorable consideration is respectfully requested.

Claims 23 and 24 depend either directly or indirectly from believed allowable amended claim 20. Accordingly, claims 23 and 24 are also believed to be in proper condition for allowance. Favorable consideration is respectfully requested.

Claim 38 does not appear to have been rejected specifically under either one of 35 U.S.C. 102(b) or 35 U.S.C. 103(a). In any event, claim 38 depends indirectly from believed allowable amended claim 1 and is also believed to be in proper condition for allowance. Favorable consideration is kindly requested.

Applicant looks forward to receiving favourable consideration of the instant application.

Please charge any additional fees required or credit any overpayment to Deposit Account No. 50-1142.

Respectfully submitted,



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